AMENDMENTS TO THE SPECIFICATION

Title

Please replace the title with "Inter-Metal Dielectric layer Structure and Method of the Same ~~Method of Forming~~".

Please replace paragraph [0001] with the following rewritten paragraph.

[0001] The present invention relates to ~~a method of forming~~ an inter-metal dielectric layer structure and the method of the same.

Please replace paragraph [0007] with the following rewritten paragraph.

[0007] One aspect of the present invention provides ~~a method of forming~~ an inter-metal dielectric layer structure and the method of the same with increased throughput. The structure thus formed has a lower effective dielectric constant and better mechanical strength.

Please add the following new paragraphs [0010.1], [0010.2], [0010.3], and [0010.4].

[0010.1] The inter-metal dielectric layer structure according to the present invention includes a low- k dielectric layer formed over the substrate, and a dielectric layer containing an extra element formed on the low-k dielectric layer.

[0010.2] The extra element may include nitrogen. Then the inter-metal dielectric layer structure may further include a first nitride layer formed between the low-k dielectric layer and the substrate, and a second nitride layer formed over the dielectric layer.

[0010.3] The extra element may include carbon. Then the inter-metal dielectric layer structure may further include a first carbide layer formed between the low-k dielectric layer and the substrate, and a second carbide layer formed over the dielectric layer.

[0010.4] The low-k dielectric layer may be an organic low-k dielectric layer. The organic low-k dielectric layer may be an organosilicate glass (OSG) layer or an organofluorosilicate glass (OFSG) layer.

Please replace paragraph [0018] with the following rewritten paragraph.

[0018] The first exemplary embodiment of the method according to the present invention includes the following steps. A first nitride layer **204** is formed on a substrate **102**, as shown in Fig. 2(a). Then a first black diamond layer **206**, a middle etch stop layer **208** and a second black diamond layer **210** are sequentially formed on the first nitride layer **204**, as illustrated in Fig. 2(b). And a second nitride layer **212** is formed on the second black diamond layer **210**, as shown in Fig. 2(c). The formation of the first black diamond layer **206** and the middle etch stop layer **208** is illustrated in Fig. 3. A black diamond layer **206a** is formed in advance by introducing a process gas including 3MS and O_2. Then a reactant gas, nitrogen fluoride (NF_3), is in situ introduced to etch back the black diamond layer **206a** and to react with the process gas to form a dielectric layer **208** containing nitrogen. Thus the first black diamond layer **206** and the middle etch stop layer **208** are formed. The volume ratio of the NF_3 gas to the process gas is larger than about 2. The thickness of the first black diamond layer **206** is about 200~1000 nm. And the thickness of the middle etch stop layer **208** is smaller than about 100nm.

Please add new paragraph [0018.1] as follows.

[0018.1] The first embodiment of the structure **200** formed by the first embodiment of the method is shown in Fig. 2(c). The middle etch stop layer (i.e. the dielectric layer) **208** contains nitrogen. The structure **200** includes the substrate **102**, the first nitride layer **204**, the first black diamond layer **206**, the middle etch stop layer **208**, the second black diamond layer **210**, and the second nitride layer **212**.

Please replace paragraph [0019] with the following rewritten paragraph.

[0019] The structure **200** formed according to the first embodiment of the method is suitable for devices having feature below 0.13 um. Instead of being formed in different process chambers, the layers **206**, **208** and **210** of this exemplary embodiment are formed in a single process chamber during one pump down. Therefore, rather than 5 steps, only 3 steps are needed to form an IMD layer structure **200** according to ~~this~~ the first embodiment of the method, so that the throughput can be increased. The middle etch stop layer **208** is essentially a black diamond layer with extra nitrogen. Therefore, the effective dielectric constant of the structure **200** according to ~~this~~ the first embodiment of the method is not as high as that of the typical structure. Besides, the nitrogen contained in the layer **208** could nitrogenize the dangling Si bond at the interface of the layer **206**, and the interface quality is better. Moreover, the NF_3 gas facilitates process chamber cleaning, so that the throughput is further improved.

Please replace paragraph [0020] with the following rewritten paragraph.

[0020] The second exemplary embodiment of the method according to the present invention includes the following steps. A first carbide layer **304** is formed on a substrate **102**, as shown in Fig. 4(a). Then a first black diamond layer **306**, a middle etch stop layer **308** and a second black diamond layer **310** are sequentially formed on the first carbide layer **304**, as illustrated in Fig. 4(b). And a second carbide layer **312** is formed on the second black diamond layer **310**, as shown in Fig. 4(c). The formation of the first black diamond layer **306** and the middle etch stop layer **308** is illustrated in Fig. 5. A black diamond layer **306a** is formed in advance by introducing a process gas including 3MS and O_2. Then a reactant gas, carbon fluoride (C_xF_y), is in situ introduced to etch back the black diamond layer **306a** and to react with the process gas to form a dielectric layer **308** containing carbon. Thus the first black diamond layer **306** and the middle etch stop layer **308** are formed. The volume ratio of the C_xF_y gas to the process gas is larger than about 2. The thickness of the first black diamond layer **306** is about 200~1000 nm. And the thickness of the middle etch stop layer **308** is smaller than about 100nm.

Please add new paragraph [0020.1].

[0020.1] The second embodiment of the structure **300** formed by the second embodiment of the method is shown in Fig. 4(c). The middle etch stop layer (i.e. the dielectric layer) **308** contains carbon. The structure **300** includes the substrate **102**, the first carbide layer

304, the first black diamond layer **306**, the middle etch stop layer **308**, the second black diamond layer **310** and the second carbide layer **312**.

Please replace paragraph [0021] with the following paragraph.

[0021] The structure **300** formed according to the second embodiment of the method is suitable for devices having feature below 0.13 um, or even 90 nm. Instead of being formed in different process chambers, the layers **306**, **308** and **310** of this exemplary embodiment are formed in a single process chamber during one pump down. Therefore, rather than 5 steps, only 3 steps are needed to form an IMD layer structure **300** according to ~~this~~ the second embodiment of the method, so that the throughput can be increased. The middle etch stop layer **308** is essentially a black diamond layer with extra carbon. Therefore, the effective dielectric constant of the structure **300** according to ~~this~~ the second embodiment of the method is not as high as that of the typical structure. Besides, the carbon contained in the layer **308** could carbonize the dangling Si bond at the interface of the layer **306**, and then the interface quality is better. Moreover, the C_xF_y gas facilitates process chamber cleaning, so that the throughput is further improved.

In the Abstract, please replace paragraph [0024] with the following rewritten paragraph.

[0024] A ~~method of forming~~ an inter-metal dielectric layer structure and the method of the same are ~~is~~ provided. The method includes the following steps. A process gas is introduced to form a low-k dielectric layer over the substrate. A reactant gas is in situ introduced to etch the low-k dielectric layer back and to react with the process gas to form a dielectric layer containing an extra element on the low-k dielectric layer. The extra element is provided by the reactant gas. A volume ratio of the reactant gas to the process gas is larger than about 2. The reactant gas may be a nitrogen fluoride (NF_3) gas for providing extra nitrogen (N) or a carbon fluoride (C_xF_y) gas for providing extra carbon (C).